

Claims

What is claimed is:

1. A heteroscopic turbine with a Knudsen number of less than 10.

2. A heteroscopic turbine that generates a flow from a gas, molecules in said gas characterized by a mean free path distance, comprising:

a moving surface; and

a plurality of turbine blades on or in said surface, each of said blades having a height comparable to said mean free path distance, said blades spaced apart by a distance comparable to said mean free path distance.

3. A heteroscopic turbine as in claim 2, wherein in operation said surface moves such that said turbine blades pass through said gas at a speed comparable to a mean thermal velocity of molecules in said gas.

4. A heteroscopic turbine as in claim 3, wherein said blades are arranged on chips that are attached in or on said disk.

5. A heteroscopic turbine as in claim 4, wherein said blades are attached directly in or on said disk.

6. A heteroscopic turbine as in claim 3, wherein when said turbine spins, tops of said blades form a direction selection plane that filters molecules moving toward said disk and generates a flow from said molecules.

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2 7. A heteroscopic turbine as in claim 6, wherein said flow creates forced  
3 convection in a direction of said flow, thereby transferring heat in a direction of said flow.  
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5 8. A heteroscopic turbine as in claim 3, wherein said blades are formed by edges  
6 of holes in said surface.  
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8 9. A heteroscopic turbine as in claim 3, wherein said blades are angled planes  
9 projecting from said surface with openings for molecules to pass at angles formed between said  
10 planes and said surface.  
11

12 10. A heteroscopic turbine as in claim 9, further comprising ducting to transport  
13 molecules that have been selected by said blades.  
14

15 11. A heteroscopic turbine as in claim 3, wherein said blades have at least two  
16 different heights, and  
17 wherein when said turbine spins, tops of said blades having a first height form a  
18 direction selection plane that filters molecules moving toward said disk, and tops of blades  
19 having a second height form a speed selection plane that filters molecules based on mean thermal  
20 velocity;  
21 whereby hotter and cooler molecules are sorted.  
22

23 12. A heteroscopic turbine as in claim 11, further comprising ducting to transport  
24 said hotter molecules, said cooler molecules, or both said hotter and said cooler molecules.  
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1                   13. A heteroscopic turbine as in claim 11, further comprising surfaces that reflect  
2 said hotter molecules or said cooler molecules away from said surface.

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4                   14. A heteroscopic turbine as in claim 11, further comprising baffles between  
5 rows of said blades.

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7                   15. A heteroscopic turbine as in claim 11, wherein said blades are curved  
8 concavely in a direction of motion through said gas.

9  
10                  16. A heteroscopic turbine as in claim 3, wherein said blades are stacked in  
11 layers, a top one of said layers preferentially capturing cooler molecules, and a bottom one of  
12 said layers preferentially capturing hotter molecules;  
13 whereby hotter and cooler molecules are sorted.

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15                  17. A heteroscopic turbine as in claim 16, further comprising ducting to transport  
16 said hotter molecules, said cooler molecules, or both said hotter and said cooler molecules.

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18                  18. A heteroscopic turbine as in claim 16, further comprising baffles between  
19 rows of said blades.

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21                  19. A heteroscopic turbine as in claim 16, wherein said blades are curved  
22 concavely in a direction of motion through said gas.

23  
24                  20. A heteroscopic turbine as in claim 3, wherein said blades are angled planes  
25 projecting from said surface, with openings for cooler molecules to pass at angles formed

1 between said planes and said surface, and with opening for hotter molecules to pass through said  
2 surface;

3 whereby hotter and cooler molecules are sorted.  
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5 21. A heteroscopic turbine as in claim 20, further comprising ducting to transport  
6 said hotter molecules, said cooler molecules, or both said hotter and said cooler molecules.  
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8 22. A heteroscopic turbine as in claim 20, further comprising baffles between  
9 rows of said blades.  
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11 23. A heteroscopic turbine as in claim 20, wherein said blades are curved  
12 concavely in a direction of motion through said gas.  
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14 24. A heteroscopic turbine as in claim 3, wherein said blades are thicker at their  
15 bases.  
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17 25. A heteroscopic turbine as in claim 3, wherein said moving surface is a rotor  
18 that rotates between two stators.  
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20 26. A heteroscopic turbine as in claim 25, wherein one of the two stators includes  
21 barriers positioned such that hotter molecules pass through said rotor to one side of said barrier  
22 and cooler molecules pass through said rotor to another side of said barrier;  
23 whereby hotter and cooler molecules are sorted.  
24

25 27. A heteroscopic turbine as in claim 25, wherein one of the two stators includes  
26 barriers arranged in pairs, each pair arranged such that hotter molecules pass through said rotor

1 to outside of said pair of barriers and cooler molecules pass through said rotor to between said  
2 pair of barriers;

3 whereby hotter and cooler molecules are sorted.  
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5 28. A heteroscopic turbine as in claim 25, wherein the rotor flies over at least one  
6 of the stators due to Eckman airflow, magnetic levitation, or both.  
7

8 29. A heteroscopic turbine as in claim 25, further comprising ducting to transport  
9 molecules that have passed through said rotor.  
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11 30. A heteroscopic turbine as in claim 25, wherein said rotor includes angled  
12 surfaces for redirecting hotter molecules or cooler molecules radially.  
13

14 31. A heteroscopic turbine as in claim 25, wherein input ports in one of the two  
15 stators are funnel shaped.  
16

17 32. A heteroscopic turbine that sorts hotter molecules and cooler molecules,  
18 wherein a ratio of work done on the molecules to a mean difference in speeds between the hotter  
19 molecules and the cooler molecules is less than 3.1.